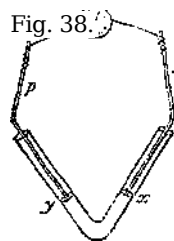


temperature may be raised so high as to cause oxidation of the zinc far more rapidly than if the pair of plates were plunged into dilute sulphuric acid; for the oxygen is not part of an electrolyte, and cannot therefore conduct the forces onwards by decomposition,, or even as metals do by itself. Or if its gaseous state embarrass the minds of some, then liquid chlorine may be taken. It does not excite a current of electricity through the two plates by combining with the zinc, for its particles cannot transfer the electricity active at the point of combination across to the platina. It is not a conductor of itself, like the metals; nor is it an electrolyte, so as to be capable of conduction during decomposition, and hence there is simple chemical action at the spot, and no electric current.¹



657. It might at first be supposed that a conducting body, not electrolytic, might answer as the third substance between the zinc and the platina; and it is true that

we have some such capable of exerting chemical action upon the metals. They must, however, be chosen from the metals themselves, for there are no bodies of this kind except those substances and charcoal.

To decide the matter by experiment, I made the following arrangement. Melted tin was put into a glass tube bent into the form of the letter V, fig. ,38 so as to fill the half of each limb, and two pieces of thick platina

wire, *p*, *w*, inserted, so as to have their ends immersed some depth in the tin: the whole was then allowed to cool, and the ends *p* and *w* connected with a delicate galvanometer. The part of the tube at *x* was now reheated, whilst the portion *y* was retained cool. The galvanometer was immediately influenced by the thermo-electric current produced. The heat was steadily increased at *x*, until at last the tin and platina combined there; an effect which is known to take place with strong chemical action and

high ignition; but not the slightest additional effect occurred at the galvanometer. No other deflection than that due to the thermo-electric current

¹I do not mean to affirm that no traces of electricity ever appear in such cases. What I mean is, that no electricity is evolved in any way, due or related to the causes which excite voltaic electricity, or proportionate to them. That which does appear occasionally is the smallest possible fraction of that which the acting matter could produce if arranged so as to act voltaically, probably not the one-hundred-thousandth, or even the millionth part, and is very probably altogether different in its source.